REMARKS

Status of the Claims

Claims 1, 3, 4 and 6-20 are pending in the present application. Claims 1 and 4 are independent.

Claim 4 has been amended and is at least supported at page 2, lines 20-29; page 3, line 23 to page 4, line 3; and page 5, lines 6-15. Thus, no new matter has been added by way of amendment to the claims.

Reconsideration of this application, as amended, is respectfully requested.

Request for Entry of Response After Final Rejection

This response should be entered after final rejection because it automatically places the claims in condition for allowance.

In the event that the Examiner disagrees and finds that this response does not place this application into condition for allowance, the Examiner is requested to enter this response because it places the application into better condition for appeal.

Rejections under 35 U.S.C. § 103(a)

Claims 1 and 16-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Beroza and Kinman, "Sesamin, sesamolin, and sesamol content of the oil of sesame seed as affected by strain, location grown, ageing, and frost damage," JAOCS, Vol. 32, No. 6, June, 1955, pages 348-350 (hereinafter "Beroza") alone, or as further evidenced by The Merck Index, Stecher, P.G., ed., 1968, Merck & Co., Inc., Rahway, NJ, pages 943-944 (hereinafter "Stecher").

Claims 1, 3 and 16-18 stand rejected under 35 U.S.C. § 103(a) as being obvious over Beroza alone or taken with Fukuda et al., "Contribution of lignan analogues to antioxidative activity of refined unroasted sesame seed oil," JAOCS, Vol. 63, No. 8, August, 1986, pages 1027-1031 (hereinafter "Fukuda"), and as further evidenced by Stecher.

As evidenced by the present Specification, when 207 or 471 mg high-purity sesaminol (S2) is added to 100 g of a bland salad oil the resulting oil mixture has a harsh bitter taste. When 52, 104 or 155 mg of high-purity sesaminol (S2) is added to 100 g of the same bland oil, the oil does not

taste bitter. (See page 8 of the Specification.) Thus, 0.2 wt% or higher of sesaminol (S2) contained in a bland oil, causes the oil to be bitter.

One of skill in the art would recognize that refined sesame seed oil is typically produced by commercial processes involving extraction of crude oil, alkali treatment of the crude oil, bleaching of the alkali treated product and deodorization of the bleached product. (See present Specification; Table 2, Oils 1-5 of the Fukuda reference; Menezes reference; and attached www.biodiesel-machine.com/sesame-oil-refining.html.) The bleaching processes commonly used in the commercial production/refining of many food oils (*i.e.*, sesame seed oil and canola oil, *etc.*) removes color compounds from the oil to make the product more attractive to consumers and to increase the oils' stability. (See attached www.canolainfo.org/canola/index.php?page=6 and discussion of cited art below.)

As explained in the present Specification at page 3, sesaminol (S2) is formed from sesamolin (S1) via a chemical reaction that occurs during conventional bleaching of sesame seed oil to produce a refined oil. Fukuda (cited in the Office Action) teaches at page 1029 that

> The results shown in Table 2 revealed that significant chemical changes took place mainly at the bleaching stage using acid clay. These were epimerization of sesamin (41%); disappearance of sesamolin [(S1)]; and production of sesamol, sesaminol [(S2)], its epimers and a minor amount of sesamol dimer...the production of sesaminol [(S2)] after the bleaching step has not been reported before.

Fukuda goes on to test his hypothesis that sesaminol (S2) is produced from sesamolin (S1) during commercial bleaching processes and describes the testing and confirmation of his hypothesis at page 1029, where he states

> To investigate whether the chemical changes, namely, epimerization of (+)sesamin and production of sesamol and sesaminol [(S2)], in the bleaching stage as shown in Table 2 depend upon acid clay or not, 2 ml of the oil before bleaching (oil no. 3 in Table 2) was warmed in vacuo at 90 C with addition of 0.5 g acid clay for one hr. Formation of (+)episesamin, sesaminol [(S2)] and sesamol was confirmed by HPLC and TLC analyses as shown in Figure 4. If sesamolin [(S1)] was completely decomposed to sesamol, the amount of sesamol would be ca. 154 mg/100 g oil. But actually sesamol was 46.3 mg/100 g oil; hence, it was assumed that a part of the sesamolin [(S1)] was converted to sesaminol [(S2)] or its epimers. To confirm this point, 2 ml of corn oil to which 5 mg of sesamolin [(S1)] was added was warmed in vacuo at 90 C with 0.5 g acid clay for one hr, and the formation of sesaminol [(S2)]

and sesamol were confirmed by HPLC analysis, as shown in Figure 5. These results confirmed the production of sesaminol [(S2)] from sesamolin [(S1)] by acid catalysis. [emphasis added]

Sesamolin (S1) is present in unbleached sesame oil (Abstract and Table 2, Oils 1-3, of Fukuda reference; Table 1 of Beroza reference). As explained by Fukuda sesamolin (S1) present in crude sesame oil is converted to sesaminol (S2) during bleaching processes used in refining the oil. Thus, in Table 2, Fukuda reports that bleached oils 4 and 5 contain sesaminol (S2).

At page 3 of the Office Action it is alleged that "[t]he sesame oil of Beroza would be expected to be the same sesame oil that is set forth in the claims." However, as explained by the Applicants in the Amendment filed October 4, 2010, the sesame seed oils taught by Beroza are not bleached. Beroza's oils are merely crude sesame seed oils prepared by cold-pressing and filtering of the exudate (page 348 of the Beroza reference). As explained above, bleaching removes color compounds from the oil and compounds that reduce stability of the oil. Thus, contrary to the allegation made in the Office Action, Beroza's unbleached/unrefined sesame oil would not be expected to be the same as the bleached and refined sesame oil set forth in the claims.

Further, the Specification and cited art teach that the chemical composition of sesame oil changes when conventional bleaching methods are employed, because sesamolin (S1) present in crude sesame oil is converted to sesaminol (S2). As Beroza's sesame seed oils are unbleached and unrefined, one of skill in the art would conclude that they likely have little, if any, sesaminol (S2) in view of the teachings of the cited art (*i.e.*, Fukuda).

This conclusion is further supported in that sesamol was found only in a few of the oils tested by Beroza (Table 1) and then only in trace amounts, because, as discussed above, Fukuda teaches that, in addition to sesaminol (S2), significant amounts of sesamol are produced from sesamolin (S1) during conventional bleaching processes. Thus, Beroza's unbleached/unrefined sesame oil would not be expected to be the same as the bleached and refined sesame oil set forth in the claims, because Beroza's oil contains color compounds and stability reducing compounds that have been removed from the claimed bleached sesame oils and because Beroza's oils do not include compounds that are produced as a result of bleaching (*i.e.*, sesaminol (S2), sesamol and episesamin).

Further on page 3 of the Office Action it is stated that "Applicant argues that refined sesame oils are bitter and not bland, as urged by Stecher. There is no suggestion that Beroza is bitter and there is no indication that Applicant's oil is highly refined." Although Beroza is silent regarding the

taste of the oils he tested, one of skill in the art would predict Beroza's oils to be bland, because Beroza's oils are unbleached and thus, sesaminol (S2) produced during conventional bleaching processes is likely not present in Beroza's oils. As discussed above, the present Specification discloses results that presence of 0.2 wt% sesaminol (S2) causes an otherwise bland oil to be bitter.

Applicants further submit the following table comparing the composition of Beroza's crude sesame oils with oils taught by Fukuda.

	wt% sesamin	wt% sesamolin (S1)	wt% sesamol	wt% sesaminol (S2)
Beroza's SC 967-1-1-B crude sesame oil	1.13	0.316	0	Not determined
Beroza's SC 939-3-1-B crude sesame oil	1.12	0.426	0	Not determined
Beroza's PI 153517-1-1-B crude sesame oil	1.02	0.373	0	Not determined
Fukuda's Crude Sesame Oil #1	0.8133	0.510	0.0043	0
Fukuda's Sesame Oil #3 alkali-treated and washed	0.6678	0.4248	0.0007	0
Fukuda's Sesame Oil #4 alkali-treated, washed and bleached	0.3755	0	0.0463	0.0339

Fukuda's oil 1 is a crude sesame oil that has not undergone an alkali-treatment or bleaching (page 1027 of Fukuda). Analogously, the oils listed in Beroza's Table 1 are also crude sesame oils that have merely been cold-pressed and filtered. Fukuda's oil 1 has similar levels of sesamin, sesamolin and sesamol to oils disclosed by Beroza listed in the table above, though the sesamin level is lower (~ 0.8 wt% sesamin) than that taught by Beroza (~ 1 wt% sesamin). However, after alkali treatment and bleaching of oil 1, Fukuda's partially refined oil 4 contains less than half of the sesamin originally present in the crude oil 1. Thus, one of skill in the art would expect that when conventional refining (including bleaching) is performed on Beroza's crude oils significantly less than 1 wt% of the sesamin would remain and significant levels of sesaminol (S2) (produced during bleaching from the sesamolin (S1)) would be present in the refined oil.

Thus, the combined teachings of Beroza, Fukuda and Stecher do not teach the claimed bleached and refined sesame oil without a bitter taste having a sesamin content of 1% by weight or more of sesamin and 0.2% by weight or less of sesaminol, as in the claimed invention.

In view of the discussion above, Applicants respectfully request that the rejection of claims 1, 3 and 16-18 under 35 U.S.C. § 103(a) be withdrawn.

Claims 4, 6-16, 19 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Menezes et al., "Sesame oil. II. Some chemical and physical properties of the oils from different varieties of sesame seed," JAOCS, Vol. 27, No. 5, May, 1950, pages 184-186 (hereinafter "Menezes") in view of Bailey's Industrial Oil and Fat Products, 5th Edition, Hui, Y.H., ed., Vol. 4, 1996, page 201 (hereinafter "Hui") and further in view of Bailey's Industrial Oil and Fat Products, 4th Edition, Swern, D., ed., Vol. 2, 1982, pages 294-295 and 303 (hereinafter "Swern").

Claim 4 and claims 6-16, 19 and 20, which depend from claim 4, all recite methods for the production of refined sesame oil without a bitter taste having at least 1% by weight sesamin and not more than 0.2% sesaminol comprising, (a) providing unparched sesame seeds that yield a crude sesame seed oil with at least 1% by weight sesamin upon milling, pressing or extraction, (b) milling unparched sesame seeds, (c) extracting oil from the milled sesame seeds using solvent extraction, and (d) bleaching the extracted sesame oil with activated carbon or a clay, wherein the bleaching step is carried out at a temperature from 5°C to 70°C when the bleaching is performed with clay. Thus, claims 4, 6-16, 19 and 20 all recite providing unparched sesame seeds that yield a crude sesame seed oil with at least 1% by weight sesamin upon milling, pressing or extraction.

It is stated at page 6 of the Office Action that "[i]t is appreciated that a specific sesame oil with a certain taste, sesamin and sesaminol content is not mentioned [by Menezes] but the claims are directed to the process and not to the oil prepared." Claim 4, as amended, is drawn to methods that have been modified to recite elements related to the specific oil prepared (*e.g.*, providing unparched sesame seeds of a kind that yield a crude sesame seed oil with at least 1% by weight sesamin upon milling, pressing or extraction). The combined teachings of Menezes, Hui and Swern do not teach methods employing such unparched sesame seeds with a relatively high content of sesamin.

Further, at page 6 of the Office Action it is asserted that "[i]t would have been obvious to one of ordinary skill in the art to lower the bleaching temperature of Menezes according to optimize the treatment results." None of Menezes, Hui or Swern teaches the benefits of a bleached sesame oil having at least 1% by weight sesamin and minimal amounts of sesaminol (S2).

As discussed above, the purpose of bleaching generally acknowledged in the art is to remove color compounds and certain compounds that reduce the stability of the oil, and this is

supported by the teachings of the cited art, specifically the teachings of Swern, Hui, and Menezes. Thus, Swern at page 294 teaches that "[i]n general the edible oil processor is concerned with bleaching to reduce the Lovibond red color of refined oils from 4.0-9.0 to about 1.5-2.5 units, and at the same time remove any green pigments almost completely if they are present." Hui teaches at page 201 that "[b]esides decolorizing, treatment of an alkali-refined oil with bleaching earth serves the important function of largely removing traces of soap." Thus, "optimizing the treatment results" as suggested in the Office Action arguably involves optimizing removal of color compounds and optionally, stability reducing compounds, not optimizing bleaching to reduce sesaminol production.

Menezes teaches that "crude sesame oils were refined according to the official method (5) of the American Oil Chemists' Society for solvent-extracted soybean oils" using "official American Oil Chemists' Society earth" in the bleaching steps (page 184 of Menezes). Further, Menezes discloses the Lovibond color levels for sesame oils 1-4 (SO-1 to SO-4) before and after refining (including bleaching). The values are reproduced in the table below for ease of reference.

	Menezes' Sesame Oils			
	SO-1	SO-2	SO-3	SO-4
Lovibond red color of crude sesame oil	2.4	16.7	4.3	4.0
Lovibond red color of oil after refining including bleaching	1.2	1.6	0.6	1.2

Thus, the bleaching methods taught by Menezes that are part of the "official method" of refining sesame oil by the American Oil Chemists' Society is in keeping with the teaching by Swern that optimal bleaching processes produce refined oils with 1.5-2.5 units or less of Lovibond red color.

The combined teachings of the cited references provide no motivation for one of skill in the art to modify the bleaching step (the official method of the AOCS) for removing color compounds taught by Menezes to arrive at the claimed invention, because all of the references teach bleaching as a means to maximize removal of color compounds. The cited references also provide no motivation to one of ordinary skill in the art to modify a bleaching process that has been optimized to remove a maximum amount of color compounds in order to instead optimize sesamin content in the refined oil while at the same time minimizing sesaminol (S2) that is produced as a result of the bleaching process.

In view of the discussion above, Applicants respectfully request that the rejection of claims 4, 6-16, 19 and 20 under 35 U.S.C. § 103(a) be withdrawn.

CONCLUSION

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Stephanie A. Wardwell, PhD, Registration No. 48,025, at the telephone number of the undersigned below to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Director is hereby authorized in this, concurrent, and future replies to charge any fees required during the pendency of the above-identified application or credit any overpayment to Deposit Account No. 02-2448.

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Respectfully submitted,

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Attachments: www.biodiesel-machine.com/sesame-oil-refining.html
www.canolainfo.org/canola/index.php?page=6